THE CLAIMS

What is claimed is:

1. A golf ball comprising a core, a barrier layer enveloping the core, and a cover enveloping the barrier layer, wherein:

the barrier layer has a moisture vapor transmission rate less than that of the cover; and

the barrier layer comprises a thermoplastic or thermoset composition of microparticles dispersed in a binder comprising synthetic rubbers, natural rubbers, polyolefins, styrenic polymers, or single-cite catalyzed polymers.

2. The golf ball of claim 1, wherein the binder comprises a styrenic polymer comprising styrene-butadiene copolymers, poly(styrene-co-maleic anhydride), acrylonitrile-butylene-styrene copolymers, styrene-olefin block copolymers, or poly(styrene sulfonate).

3. The golf ball of claim 2, wherein the styrenic polymer comprises at least one styrene-olefin block copolymer.

4. The golf ball of claim 1, wherein the microparticles comprise fibers; whiskers; metal flakes; micaceous particles; or nanoparticles.

5. The golf ball of claim 4, where the metal flakes comprises aluminum flakes; iron oxide flakes; copper flakes; or bronze flakes.

6. The golf ball of claim 5, where the aluminum flakes comprise aluminum oxide.

7. The golf ball of claim 1, wherein the microparticles have a particle size of about 4 microns to about 335 microns.

8. The golf ball of claim 1, wherein the microparticles are present in an amount of about 50 parts to about 250 parts per 100 parts by weight of the binder.

9. The golf ball of claim 1, wherein the composition has a particle-to-binder weight ratio of about 1 to about 2.

10. The golf ball of claim 1, wherein the binder is thermoset and further comprises a cross-linking agent.

11. The golf ball of claim 10, wherein the cross-linking agent comprises a polyolefin polyol comprising hydrogenated polybutadiene polyols.

12. The golf ball of claim 11, wherein the cross-linking agent is present in an amount of at least about 10 parts per 100 part by weight of the binder.

13. The golf ball of claim 11, wherein the cross-linking agent is present in an amount of at least about 20 parts per 100 part by weight of the binder.

14. The golf ball of claim 1, wherein the composition further comprises a catalyst or a coupling agent.

15. The golf ball of claim 14, wherein the barrier layer is directly bonded to the cover through the coupling agent.

16. The golf ball of claim 1, wherein the barrier layer has a thickness of about 0.001 inches to about 0.01 inches.

17. The golf ball of claim 1, wherein the barrier layer has a thickness of about 0.002 inches to about 0.007 inches.

18. The golf ball of claim 1, wherein the barrier layer has a moisture vapor transmission rate of less than about 0.95 grams·mm/(m^2·day).

19. The golf ball of claim 1, wherein the barrier layer has a moisture vapor transmission rate of less than about 0.65 grams·mm/(m^2·day).

20. The golf ball of claim 1, wherein the barrier layer has a Sward hardness of about 5 to about 20.

21. The golf ball of claim 1, wherein the barrier layer has a pencil hardness of about 5B to about F.

22. The golf ball of claim 1, wherein the barrier layer has a specific gravity between about 1 g/cm^3 and about 1.5 g/cm^3.

23. The golf ball of claim 1, wherein the barrier layer has a specific gravity greater than that of the core by at least about 0.1 g/cm^3.

24. The golf ball of claim 1, wherein the composition is dispersed in a non-aqueous solvent system comprising aromatic hydrocarbons, ketones, acetates, alcohols, or esters.

25. The golf ball of claim 24, wherein the solvent-borne dispersion has a solid content of at least about 15%.

26. The golf ball of claim 24, wherein the solvent-borne dispersion has a solid content of at least about 30%.

27. The golf ball of claim 24, wherein the solvent-borne dispersion has a viscosity of about 300 cps to about 1,500 cps.

28. The golf ball of claim 24, wherein the solvent-borne dispersion has a viscosity of about 500 cps to about 1,000 cps.

29. The golf ball of claim 24, wherein the solvent-borne dispersion has a viscosity of about 700 cps to about 900 cps.

30. The golf ball of claim 1, wherein the barrier layer is applied using spraying or dipping.

31. A golf ball comprising a core, a barrier layer enveloping the core, and a cover enveloping the barrier layer, wherein:

the barrier layer has a moisture vapor transmission rate less than that of the cover; and

the barrier layer comprises aluminum flakes comprising aluminum oxide.

32. A golf ball comprising a core, a barrier layer enveloping the core, and a cover enveloping the barrier layer, wherein:

the barrier layer has a moisture vapor transmission rate less than that of the cover; and

the barrier layer comprises a means for creating a hydrophobic tortuous path across the barrier layer.

33. A golf ball comprising:

a core having a diameter of at least about 1.62 inches;

a barrier layer of less than about 0.02 inches thick enveloping the core; and

a cover of less than 0.03 inches thick enveloping the barrier layer, wherein the barrier layer has a moisture vapor transmission rate less than that of the cover.

34. The golf ball of claim 33, wherein the barrier layer comprises a thermoplastic or thermoset composition of microparticles dispersed in a binder.

35. The golf ball of claim 34, wherein the microparticles comprise aluminum flakes comprising aluminum oxide, and the binder comprises at least one styrenic polymer.

36. The golf ball of claim 34, wherein the composition further comprises a cross-linking agent, a catalyst, or a coupling agent.

37. The golf ball of claim 34, wherein the composition is dispersed in a non-aqueous solvent system comprising aromatic hydrocarbons, ketones, acetates, alcohols, or esters.

38. The golf ball of claim 34, wherein the composition has a particle-to-binder weight ratio of about 0.5 to about 2.5.

39. The golf ball of claim 33, wherein the barrier layer has a moisture vapor transmission rate of less than about 0.95 grams·mm/(m^2·day).

40. The golf ball of claim 33, wherein the thickness of the barrier layer is about 0.002 inches to about 0.007 inches.

41. The golf ball of claim 33, wherein the core has:

a diameter of about 1.62 inches to about 1.64 inches;

a compression of less than about 100;

a deflection at 100 kg of greater than about 1.5 mm;

a coefficient of restitution of greater than about 0.78; and

a specific gravity of less than about 1.4 g/cm^3.

42. The golf ball of claim 33, wherein the core comprises:

a polybutadiene having a Mooney viscosity of greater than about 35;

a crosslinking agent in an amount of greater than about 15 parts per 100 parts by weight of the polybutadiene; and

an optional plasticizer.

43. The golf ball of claim 33, wherein the core comprises:

a center having a diameter of about 0.5 inches to about 1.6 inches, a compression of about 10 to about 100, a deflection at 100 kg of greater than about 1.5 mm; and

an outer core layer enveloping the center.

44. The golf ball of claim 43, wherein the center comprises:

a polybutadiene having a Mooney viscosity of greater than about 35;

a crosslinking agent in an amount of about 15 part to about 40 parts per 100 parts by weight of the polybutadiene;

a regrind or filler; and

an optional plasticizer.

45. The golf ball of claim 43, wherein the outer core layer comprises:

a polybutadiene having a Mooney viscosity of greater than about 35;

a crosslinking agent in an amount of about 25 part to about 55 parts per 100 parts by weight of the polybutadiene;

a regrind, polyisoprene, or filler; and

an optional plasticizer, wherein the outer core layer has a material hardness of greater than about 60 Shore C.

46. The golf ball of claim 33, wherein the cover has an outermost surface occupied by about 250 to about 450 dimples, and comprises:

a composition formed from a thermoplastic polyurethane, a thermoset polyurethane, a thermoplastic polyurea, or a thermoset polyurea; and

the composition having a material hardness of about 25 Shore D to about 65 Shore D and a flexural modulus of at least about 2,000 psi.

47. The golf ball of claim 33, wherein the golf ball has:

a compression of less than about 110;

a coefficient of restitution greater than about 0.79;

a moment of inertia greater than about 84 $g \cdot cm^2$; and

a deflection at 100 kg of greater than about 1.5 mm.